CLAIMS

What is claimed is:

1. A video imaging system, comprising:

a field emission array including:

a p-type substrate comprising an image detection surface;

an n-well recessed in said p-type substrate;

a diffusion region between said p-type substrate and said n-well;

at least one emitter tip disposed in communication with said n-well;

a capacitor, a first side of which is in communication with said n-well;

a baseline potential transistor in communication with a second side of said capacitor; and

a signal transmission transistor in communication with said second side;

an image signal detector associated with said signal transistor; and

an extraction grid disposed over said field emission array and including at least one aperture therethrough located substantially over said at least one emitter tip.

2. The video imaging system of claim 1, further comprising a cathodo-luminescent display disposed substantially parallel to and spaced apart from said extraction grid and including at least one display pixel corresponding to said at least one emitter tip.

3. The video imaging system of claim 1, wherein said baseline potential transistor and said signal transmission transistor share a common drain.

4. The video imaging system of claim 1, wherein a distance between said image detection surface and said n-well facilitates detection of electromagnetic radiation of a near infrared wavelength.

5. The video imaging system of claim 1, wherein a distance between said image detection surface and said n-well facilitates detection of electromagnetic radiation of a visible wavelength.

6. The video imaging system of claim 1, wherein said image signal detector is in communication with a source node of said signal transmission transistor.

7. The video imaging system of claim 1, further comprising a shutter component.

8. The video imaging system of claim 7, wherein said shutter component is configured to prevent electromagnetic radiation from impinging said n-well.

9. The video imaging system of claim 1, wherein said diffusion region is located proximate to said image detection surface and further comprising a layer of detection enhancement material adjacent said image detection surface.

10. The video imaging system of claim 9, wherein said detection enhancement material comprises a platinum silicide.

11. The video imaging system of claim 1, wherein said p-type substrate and said n-well each comprise a detection enhancement material.

12. The video imaging system of claim 11, wherein said detection enhancement material comprises a mercury-cadmium-tellurium alloy.

13. An image detection apparatus, comprising:

a p-type substrate comprising an emission surface, an array of n-type wells disposed in said p-type substrate substantially along a plane proximate said emission surface,

a p-n junction between said p-type substrate and each n-well of said array on n-type wells, and an image detection surface opposite said emission surface;

an array of emission pixels, each comprising at least one emitter tip protruding from said emission surface and in communication with a corresponding n-well of said array of n-type wells;

a capacitor in communication with selected n-wells of said array of n-type wells;

a signal transmission transistor in communication with said capacitor;

a baseline potential transistor in communication with said capacitor; and

an image signal detector in communication with said signal transmission transistor.

14. The apparatus of claim 13, wherein said signal transmission transistor and said baseline potential transistor share a drain node.

15. The apparatus of claim 13, wherein said image detector communicates with a source node of said signal transmission transistor.

16. The apparatus of claim 13, further comprising a shutter.

17. The apparatus of claim 16, wherein said shutter prevents electromagnetic radiation from penetrating selected n-wells of said array of n-type wells.

18. The apparatus of claim 16, wherein said shutter is positionable over a selected region of said image detection surface.

19. The apparatus of claim 13, wherein a distance between said image detection surface and an n-well of said array of n-type wells facilitates impingement of said p-n junction by electromagnetic radiation of an infrared or a near infrared wavelength.

20. The apparatus of claim 13, wherein a distance between said image detection surface and an n-well of said array of n-wells facilitates impingement of said p-n junction by electromagnetic radiation of a visible wavelength.

21. The apparatus of claim 13, further comprising a display disposed adjacent, substantially parallel to, and spaced apart from said emission surface.

22. The apparatus of claim 21, wherein said display comprises an array of display pixels, each display pixel of which corresponds substantially to at least one emission pixel of said array of emission pixels.

23. The apparatus of claim 21, wherein said display comprises a cathodo-luminescent display.

24. The apparatus of claim 13, wherein said p-n junction is located proximate to said image detection surface, said apparatus further comprising a layer of detection enhancement material adjacent said image detection surface.

25. The apparatus of claim 24, wherein said detection enhancement material comprises a platinum silicide.

26. The apparatus of claim 13, said p-type substrate and said array of n-type wells each comprise a detection enhancement material.

27. The apparatus of claim 26, wherein said detection enhancement material comprises a mercury-cadmium-tellurium alloy.

28. A method of detecting electromagnetic radiation and storing data representative of the electromagnetic radiation, comprising:

exposing a back side of a field emission array to the electromagnetic radiation to permit the electromagnetic radiation to impinge a p-n junction adjacent a selected n-well of said field emission array and to create electron-hole pairs in said p-n junction representative of a wavelength or an intensity of the electromagnetic radiation;

permitting said p-n junction to emit electrons into said selected n-well;

communicating an electrical charge created by said electrons to a first side of a capacitor;

measuring a potential across said capacitor;

communicating a baseline potential to a second side of said capacitor; and

permitting a selected emitter tip corresponding to and in communication with said selected n-wells to emit electrons representative of said wavelength.

29. The method of claim 28, further comprising shielding said back side from the electromagnetic radiation.

30. The method of claim 28, further comprising re-exposing said back side to electromagnetic radiation.

31. The method of claim 28, further comprising storing a value representative of said potential across said capacitor.

32. The method of claim 28, wherein said exposing comprises focusing an image comprising of the electromagnetic radiation onto said back side.

33. The method of claim 28, wherein said exposing comprises directing said back side toward a source of electromagnetic radiation.

34. The method of claim 28, wherein said exposing comprises opening a shutter.

35. The method of claim 28, wherein said communicating said baseline potential to said second side facilitates said permitting said selected emitter tip to emit said electrons.

36. The method of claim 35, wherein said permitting said selected emitter tip to emit said electrons comprises applying a relatively positive voltage to regions of an extraction grid disposed substantially above said selected emitter tip.

37. The method of claim 36, further comprising illuminating at least one display pixel of a display, said at least one display pixel corresponding to said selected emitter tip.

38. A video camera, comprising:

a field emission array including a p-type substrate including an array of n-wells therein, said substrate having:

a plurality of emitter tips extending from an emission surface thereof, selected emitter tips of said plurality of emitter tips in communication with a corresponding n-well of said array of n-wells; and

a detection surface opposite said emission surface;

at least one signal transmission circuit in communication with selected n-wells of said array of n-wells;

an extraction grid adjacent said substrate and including an array of apertures therethrough, each aperture of said array of apertures corresponding to at least emitter tip of said plurality of emitter tips;

a display disposed parallel to and spaced apart from said extraction grid and including an array of cathodo-luminescent display pixels, selected display pixels of said display pixels corresponding to at least emitter tip of said plurality of emitter tips;

a scan circuit in communication with said at least one signal transmission circuit;

a decoder component in communication with said scan circuit; and

a recorder mechanism in communication with said decoder component.

39. The video camera of claim 38, wherein said at least one signal transmission circuit comprises:

a capacitor in communication with a corresponding n-well of said array of n-wells;

a baseline potential transistor in communication with said capacitor, opposite said corresponding n-well; and

a signal transmission transistor in communication with said capacitor, opposite said corresponding n-well.

40. The video camera of claim 39, wherein said baseline potential transistor and said signal transmission transistor share a drain.

41. The video camera of claim 39, wherein said baseline potential transistor is in communication with a baseline charge.

42. The video camera of claim 38, further comprising a shutter component.

43. The video camera of claim 42, wherein said shutter component is configured to prevent radiation detectable by said detection surface from impinging said detection surface.

44. The video camera of claim 38, wherein a distance between said detection surface and the n-wells of said array of n-wells facilitates the detection of electromagnetic radiation of a near infrared wavelength by p-n junctions adjacent selected n-wells of said array of n-wells.

45. The video camera of claim 38, wherein a distance between said detection surface and the n-wells of said array of n-wells facilitates the detection of electromagnetic radiation of a visible wavelength by p-n junctions adjacent selected n-wells of said array of n-wells.

46. The video camera of claim 38, further comprising a radiation focusing element associated with said detection surface.

47. The video camera of claim 46, wherein said radiation focusing element comprises an optical lens adjacent said detection surface.